MANHOLE REHABILITATION

ITEM 2000 - R

PART 1 - GENERAL

WORK INCLUDED: (Sec. 01) Furnish all materials, equipment, and labor necessary to clean, plug, patch and seal all surfaces in the existing sanitary sewer manholes as specified. Patching shall include the repair of all steps, benches, and inverts as determined in the field by the Engineer and shown on drawings or described in the specifications.

Also furnish all materials, equipment, and labor necessary to adjust manholes to grade where specified.

RELATED WORK: (Sec. 02) Furnished/paid for in this Item:

Earth Excavation/Backfill
Foundation Cushion
Seeding
Concrete
Bulk Concrete
Steel Reinforcement
Maintaining Traffic

Furnished/paid for in respective Item: (as applicable)

Rock Excavation and Backfill
Granular Backfill
Pavement, Curb, Gutter, Sidewalks
Manhole Chimney Seals

BYPASS PUMPING: (Sec. 03) Where necessary to complete the work, the Contractor shall be responsible for the bypassing and/or blocking of flow in the manholes and must have prior approval by the Engineer and Owner.

1. Bypass pumping of sewer and lateral flows during the construction period.

    a. The Contractor shall bypass upstream sewage flow around the manholes designated for repair and convey the sewage to a downstream manhole or adjacent sewage system.

    b. Provisions shall be made to maintain all existing services to prevent sewage backflow into structures.

c. The Contractor shall be responsible for maintaining the integrity of the entire sewage bypass system and shall be wholly responsible for conveying the sewage out from and back into the sewage collection system. At no time shall sewage be allowed to leave the system.

d. If sewage should escape the system the Contractor shall contact the Engineer and the Owner immediately.

e. Contractor shall be liable for all damages and fines resulting from Contractor's work or non-performance of work as specified.

f. The Contractor shall be responsible for any necessary power required for bypass pumping.

WATER SUPPLY: (Sec. 04) Contractor shall provide all water necessary for all manhole rehabilitation work. Contractor shall obtain all permits and meet all other requirements of local agencies if obtaining water from fire hydrants or other public or private water supply. Contractor shall make arrangements with such agencies for billing purposes and pay all costs.

TRAFFIC CONTROL: (Sec. 05) It shall be the Contractor's responsibility to supply traffic control as required by the local agencies having jurisdiction.

DAMAGES: (Sec. 06) Should any structural damages occur as a result of the manhole rehabilitation process, the Contractor shall make all repairs prior to waterproofing to the satisfaction of the Engineer at no additional cost. If extensive damages occur, work shall be suspended until such time that all parties involved can meet to determine the cause and corrective measures necessary to minimize future damages while achieving the necessary cleaning results.

PAYMENT: (Sec. 07) Payment for cleaning, plugging, patching, sealing, bypass pumping, traffic control, restoration, step repair and all other work and materials required for manhole rehabilitation with the exception of those Items paid for in their respective Items as shown in (Sec. 02) shall be based on the unit price as shown on the bid proposal sheet. Quantities of work shall be determined by the vertical depth measured at the center of each manhole from the lowest pipe invert to the top of the manhole casting..

Payment for the installation of chimney seals and extension, and frame and covers shall be based on the unit price as shown on the bid proposal sheet. Quantities of work shall be determined by the number of manhole covers. (Each)

STORAGE OF EQUIPMENT AND MATERIAL: (Sec. 08) It shall be the Contractor's responsibility to find a suitable location to secure and store their equipment and material.

RESTORATION: (Sec. 09) It shall be the responsibility of the Contractor to restore the work site to its original condition. Disturbed lawn areas shall be seeded as determined by the Engineer.

COORDINATION WITH ENGINEER: (Sec. 10) It is the intent of these specifications that any given manhole rehabilitation work be performed during regular working hours.

a. Regular working hours are defined as 8:00 AM to 5:00 PM Monday through Friday.

PART 2 - QUALITY ASSURANCE

REFERENCE STANDARDS: (Sec. 11) Comply with the latest edition of the following:

1. ASTM C78, Test Method for Flexural Strength of Concrete.
2. ASTM C109, Test Method for Compressive Strength of Hydraulic Cement Mortars.
3. ASTM C150, Specification for Portland Cement.
4. ASTM C157, Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
5. ASTM C348, Test Method for Flexural Strength of Hydraulic Cement Mortars.
6. ASTM C666, Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
7. ASTM C923, Resilient Connectors.

INSPECTION: (Sec. 12) Once all manholes have been sealed and the proper curing time for the waterproofing materials has elapsed, the manholes will be given a field inspection by the Engineer. The inspection shall be performed at the discretion of the Engineer during the correction period following a rainfall event sufficient enough to raise the groundwater table above the problem areas. All leakage problems discovered by this inspection shall be corrected by the Contractor within an agreed upon time to the satisfaction of the Engineer at no additional cost.

PART 3 - SUBMITTALS

CONTRACTOR SHALL SUBMIT THE FOLLOWING: (Sec. 13)

1. Shop Drawings:
   a. Product data covering all materials of construction.
   b. Description of installation procedure and equipment proposed for use.
2. Proposed bypass pumping procedures and confined space entry plan.

3. Permits to work in public right of ways.

PART 4 - SAFETY

SAFETY PROCEDURES: (Sec. 14) The Contractor shall conduct all of his operations in strict accordance with all applicable Federal, State, and Local safety codes and regulations, including all OSHA requirements. Attention is drawn, in particular, to the safe working requirements for confined space entry. The Contractor shall be fully responsible and obligated to maintain a safe work environment for all individuals in and around the work areas. The Contractor shall assume all responsibility for a safe working environment for his employees.

PART 5 - PRODUCTS

SEALING PRODUCTS AND MANUFACTURERS: (Sec.15) The materials shall comprise a system specifically recommended by the manufacturer for sanitary sewer manhole rehabilitation, and shall be manufactured by IPA Systems, Inc. (The Drycon System), Preco Industries, Ltd. or approved equals.

Purpose	IPA Systems, Inc.	Preco Industries, Ltd.
Plugging	Ipanex-R or Octoplug	Preco-Plug
Patching	Octocrete	Preco-Patch
Waterproofing	Drycon	Brush-Bond

FRAMES AND COVERS: (Sec. 16) Material: The frames and covers shall be a bolt down watertight Frames and Cover (Neenah R-1916 Series) or approved equal.

In the event that a watertight frame and cover is not required and directed by the Engineer the existing frame and cover may be replaced with a (Neenah R-1050 Frame and Cover or equal)
Sizes: The Contractor shall measure the inside diameter of the manhole frame's lid recess and width of the bearing surface to properly size the manhole frame.

MANHOLE STEPS: (Sec. 17) Steps shall be Neenah R-1980 polypropylene with 1/2" grade 60 steel reinforcement, M. A. Industries, Inc. Model PSI-P or approved equal.

PART 6 - EXECUTION

GENERAL: (Sec. 18) All work shall be in strict accordance with the manufacturer's specifications and recommendations including application of all bonding agents and surface stabilizers.

When freezing temperatures are expected in the area, the Contractor shall provide, operate and maintain necessary equipment to provide the required heat in the manhole before repair work can be started.

REPAIRING AND SEALING (Sec. 19) Surface Preparation: Prior to any other work inside of a manhole, all interior wall and invert surfaces shall be cleaned using a minimum of 2,000 psi water blast to remove all foreign matter. Water blast equipment shall be capable of providing up to 5,000 psi. If all deposits have not been removed as determined by the Engineer, then a solution of muriatic acid (hydrochloric acid) at a ratio of one part acid to ten parts water shall be applied by spraying from above the manhole. After the acid solution is used, it shall be washed completely off and the manhole allowed to dry. The mixing, application, and removal of the acid solution shall be done in strict accordance with the manufacturer's specifications and recommendations. All safety procedures applicable to the handling of this acid shall be strictly adhered to. All material resulting from cleaning operation shall be removed from the manhole being cleaned and disposed of by the Contractor in accordance with applicable regulations.

Step Repair: Manhole step repair shall include replacing missing steps and others requiring replacement as determined by the Engineer. All steps shall be supplied by the Contractor. The Contractor shall remove the existing step where required, drill the necessary holes, and perform all other work to install the replacement steps. The metal portion of all steps shall be removed to a minimum depth of 2 inches (2") beneath the manhole interior wall surface and the remaining holes are to be patched prior to waterproofing.

Bottom Repair: Bottom repair shall include the patching of the invert and bench areas in the manholes as directed by the Engineer. The flow channel shall be checked for leaks and then patched. If a vitrified clay invert exists, no coating is to be applied to the channel. All other channels shall be coated. If additional bench or invert repairs are identified and deemed necessary by the Engineer, the repair shall be made with no additional payment to the Contractor. The work shall be such as required to make surfaces smooth and provide smooth flow through the manhole. The invert shall have a depth through the manhole equal to approximately one-half (1/2) the diameter of the sewer pipes with the bench areas sloping upward toward the manhole walls at approximately one inch (1") per foot. Prior to patching, all loose and deteriorated material shall be removed and disposed of by the Contractor.

Wall Repair to Stop Infiltration: Wall repair shall include the plugging and/or patching of all visible leaks, cracks, holes, voids, and deteriorated surfaces in the manholes as directed by the Engineer. Whenever heavy infiltration is present as determined by the Engineer, four (4) 5/8 inch diameter holes shall be drilled at intervals around the base of the manhole wall. Rubber hoses shall be inserted into these holes allowing enough hose to provide access for the water to seep into the manhole flow channel. All pressure leaks shall be sealed with the specified rapid setting plastic material (IPA IPANEX -R, Preco-Plug, or equal) that shall bond both mechanically and chemically to saturated surfaces and be capable of setting in approximately 45 seconds. Once the walls of the manhole have been rehabilitated, the hoses shall be removed and the holes shall be plugged with IPA IPANEX-R and Type I Portland cement. In cases where the manhole wall weeps slightly, a solution of IPA IPANEX-R, or approved equal, shall be applied to the wet areas by spray and Type I

Portland cement shall be applied directly to the IPANEX-R and hand rubbed, then allowed to set in accordance with the manufacturer's specifications and recommendations.

Surface Stabilization (Where Necessary): Once all infiltration of water has been stopped, one (1) or two (2) coats of IPA DURIPAL, or approved equal, shall be applied to the entire manhole wall to stabilize the substrata. DURIPAL shall be applied to a clean, dry, sound surface and in accordance with the manufacturer's specifications (set time 20-30 minutes) and recommendations.

Patching: Patching of manhole walls shall be required in areas where large voids exist (i.e., bricks missing in manhole walls, around steps, frames and pipes). All cracked or disintegrated material shall be removed from the area to be patched exposing a sound sub-base. IPA'S OCTOCRETE, or approved equal, shall be applied to a dampened surface. The chimney area of manholes shall be patched so that the top four (4) inches will accept a Cretex Chimney Seal, or further to accommodate extension where dictated by manhole configuration. OCTOCRETE patches shall be allowed to cure before continuing to the next steps (set time approximately 20 minutes).

Surface Coats: Waterproofing of manhole walls shall include the application of a two coat waterproofing system in strict accordance with manufacturer's specifications and recommendations. The material shall be Drycon (IPA System, Inc.) Brush-Bond (Preco Industries, Ltd), or approved equal. The waterproofing for each coat shall be applied from invert to manhole frame base flange and applied to a saturated surface (1/16 " minimum thickness). The first coat shall be gray in color and the second coat shall be white (set-up time, 2-3 hours before second application). If the manhole is deeper than fifteen (15) feet, the portion below fifteen feet shall receive a third coat of sealant making this lower portion capable of withstanding a hydrostatic pressure of 45 psi. This third coat shall be an extra coat of white material, applied 72 hours after second coat.